AP Chemistry: Acid-Base Worksheet

AP Chemistry Acid-Base WS 0809.doc

Name: _____ Date: _____ Per: _____

1. In the following equations, label each species as an acid or a base. Show the conjugate acid-base pairs.

a. $HCO_3^-{}_{(aq)} + HF_{(aq)} \leftrightarrow H_2CO_{3(aq)} + F^-_{(aq)}$

b. $HCO_3^-{}_{(aq)} + OH^-_{(aq)} \leftrightarrow CO_3^{2-}{}_{(aq)} + H_2O_{(l)}$

2. In the following reactions, identify the Lewis acid and the Lewis base.

a. $Ag^+ + 2NH_3 \leftrightarrow Ag(NH_3)_2^+$

b. $B(OH)_3 + H_2O \leftrightarrow B(OH)_4 + H^+$

3. For the following reaction, decide which species (reactants or products) are favored at the completion of the reaction.

$SO_4^{2-}{}_{(aq)} + HCN_{(aq)} \leftrightarrow HSO_4^-{}_{(aq)} + CN^-_{(aq)}$

4. Which member of each of the following pairs is the stronger acid?

a. NH_3, PH_3 b. HI, H_2Te c. HSO_3^-, H_2SO_3 d. H_3AsO_4, H_3AsO_3

e. HSO_4^-, $HSeO_4^-$

5. Calculate the concentrations of hydronium ion and hydroxide ion at 25°C in

a. 0.15M HNO_3 b. 0.010M $Ca(OH)_2$

6. A sample of orange juice has a hydronium-ion concentration of 2.9×10^{-4}M. What is the pH? Is the solution acidic?

7. The pH of human arterial blood is 7.40. What is the hydronium ion concentration?

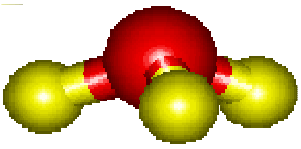
8. Pure liquid hydrogen fluoride ionizes in a way similar to that of water.
a. Write the equilibrium reaction for the self-ionization of liquid hydrogen fluoride.

b. Will sodium fluoride be an acid or a base in liquid hydrogen fluoride? Why?

c. Perchloric acid is a strong acid in liquid hydrogen fluoride. Write the chemical equation for the ionization reaction. What is the conjugate acid in this medium?

9. Boron trifluoride, BF_3, and ammonia, NH_3, react to produce $BF_3 \cdot NH_3$. A coordinate covalent bond is formed between the boron atom on BF_3 and the nitrogen atom on NH_3. Write the equation for this reaction, using Lewis electron-dot formulas. Label the Lewis acid and the Lewis base. Determine how many grams of $BF_3 \cdot NH_3$ are formed when 10.0g or each are placed in a reaction vessel, assuming that the reaction goes to completion.

10. The following shows ball and stick models of the reactants in a Lewis acid-base reaction. Write the complete equation for the reaction, including the product. Identify each reactant as a Lewis acid or a Lewis base.



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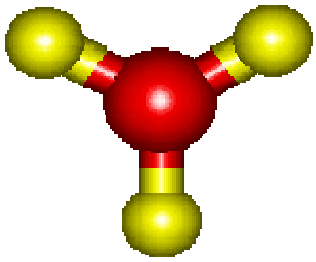

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